

1.2.2 Écrire les nombres complexes ci-dessous sous forme trigonométrique:

a) 1 Axe Re(z) [1; 0]

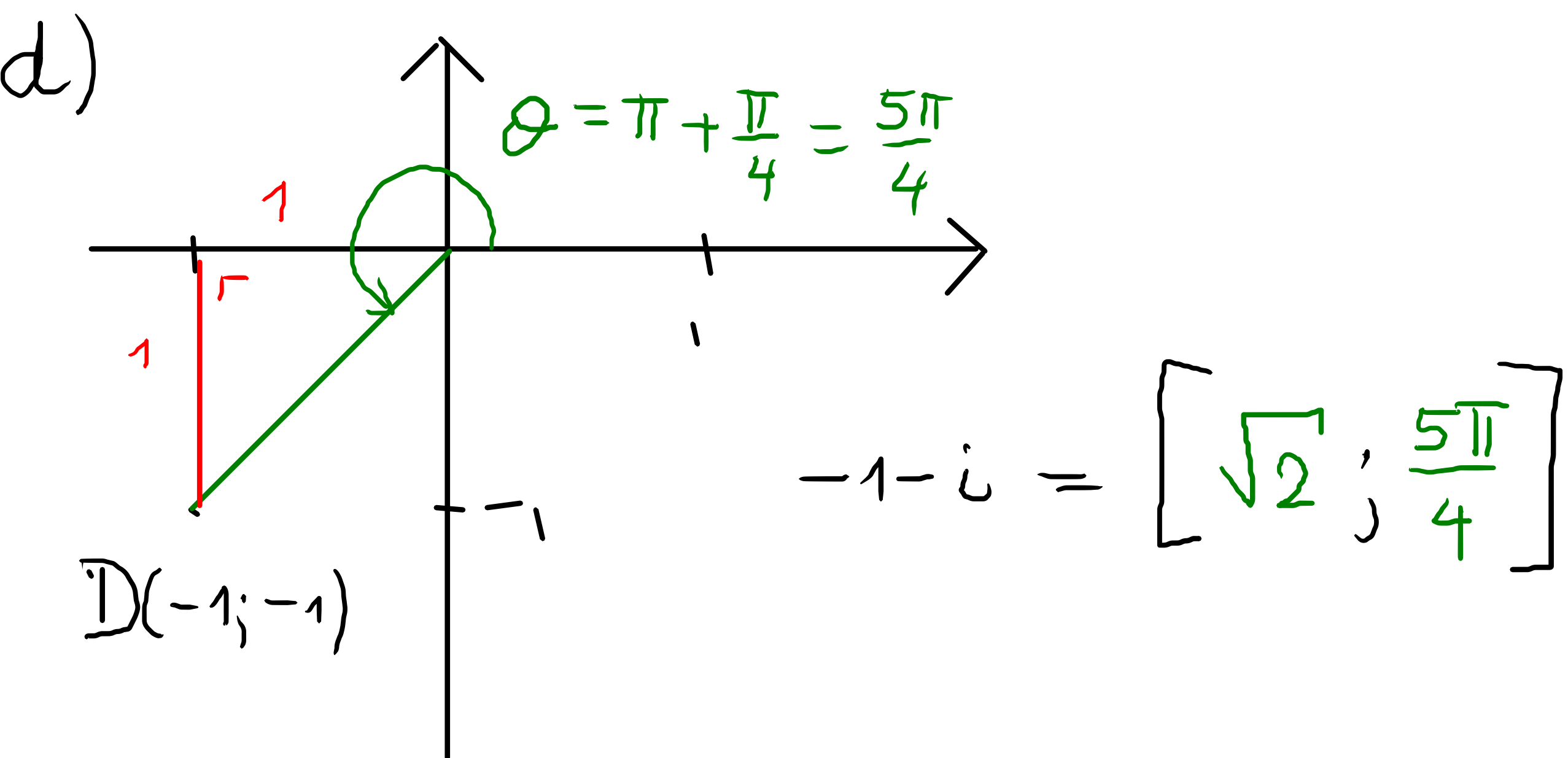
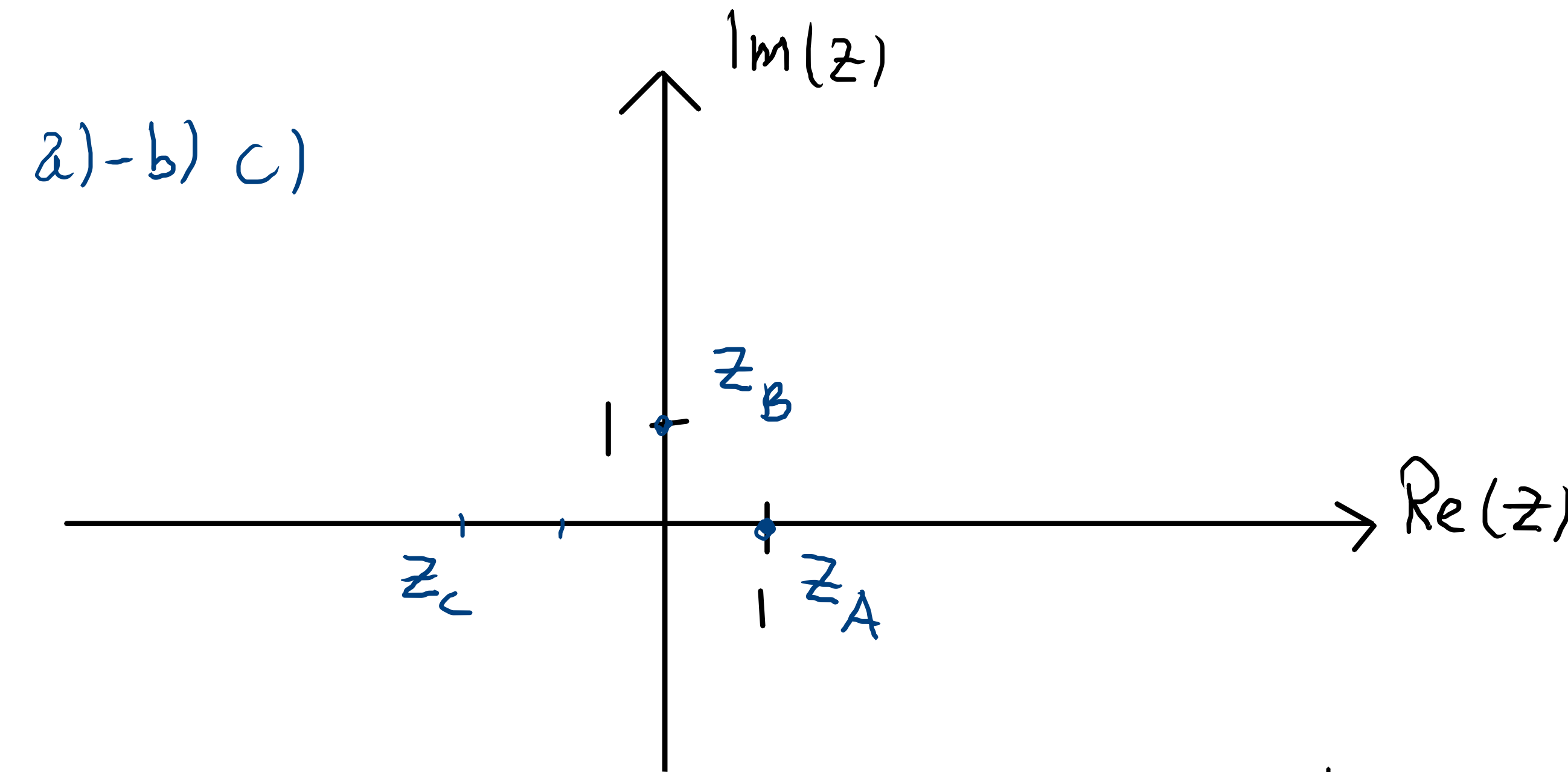
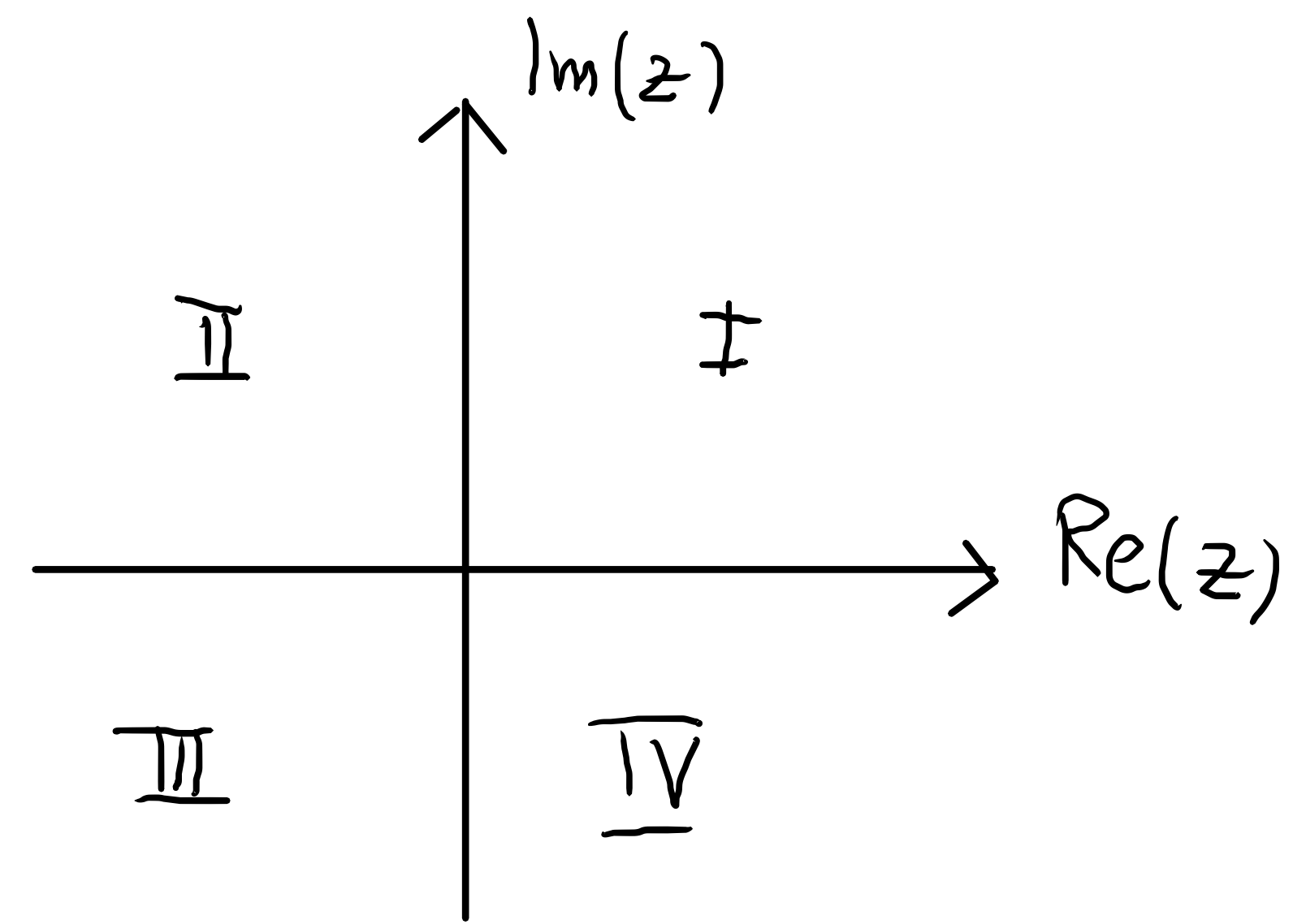
b) i Axe Im(z) [1;  $\frac{\pi}{2}$ ]

c) -2 Axe Re(z) [2;  $\pi$ ]

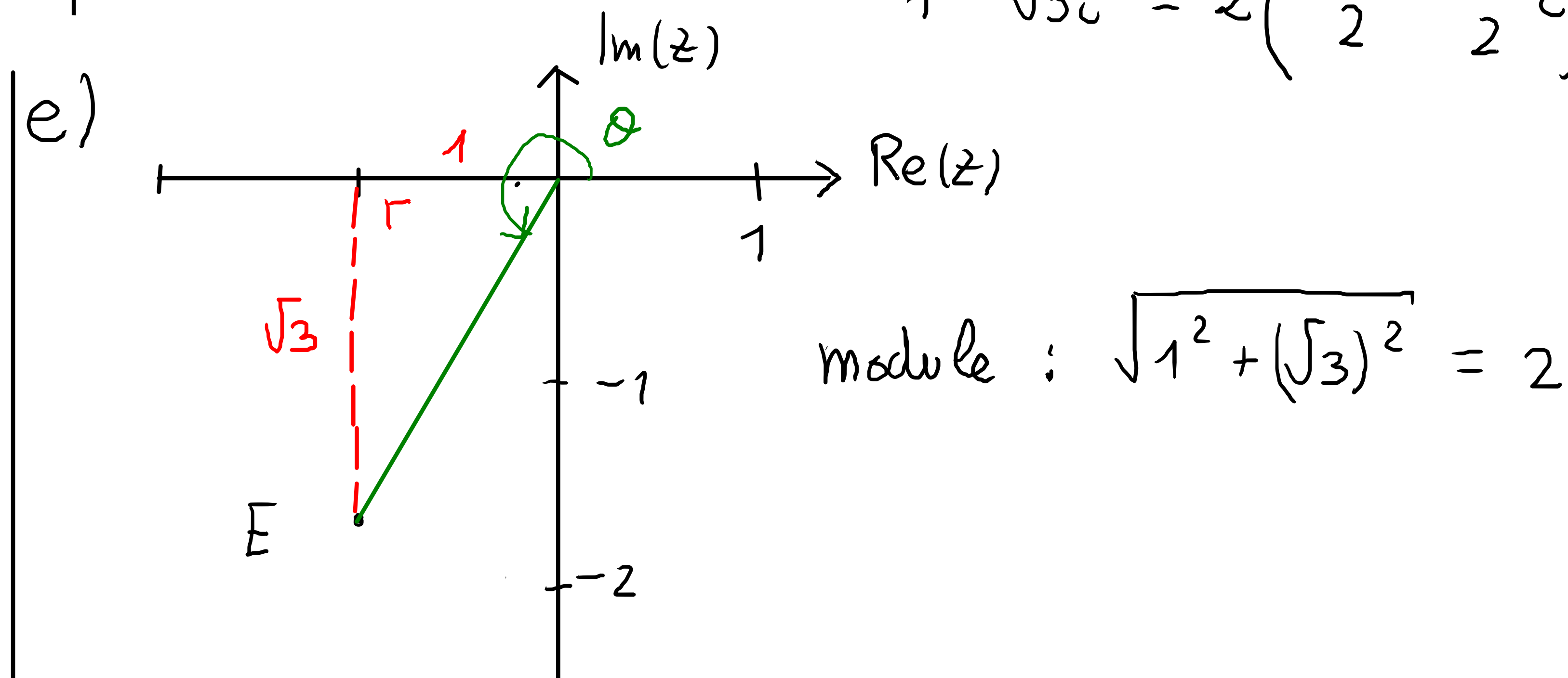
d)  $-1 - i$  III (-1; -1)

e)  $-1 - \sqrt{3}i$  III (-1;  $-\sqrt{3}$ )

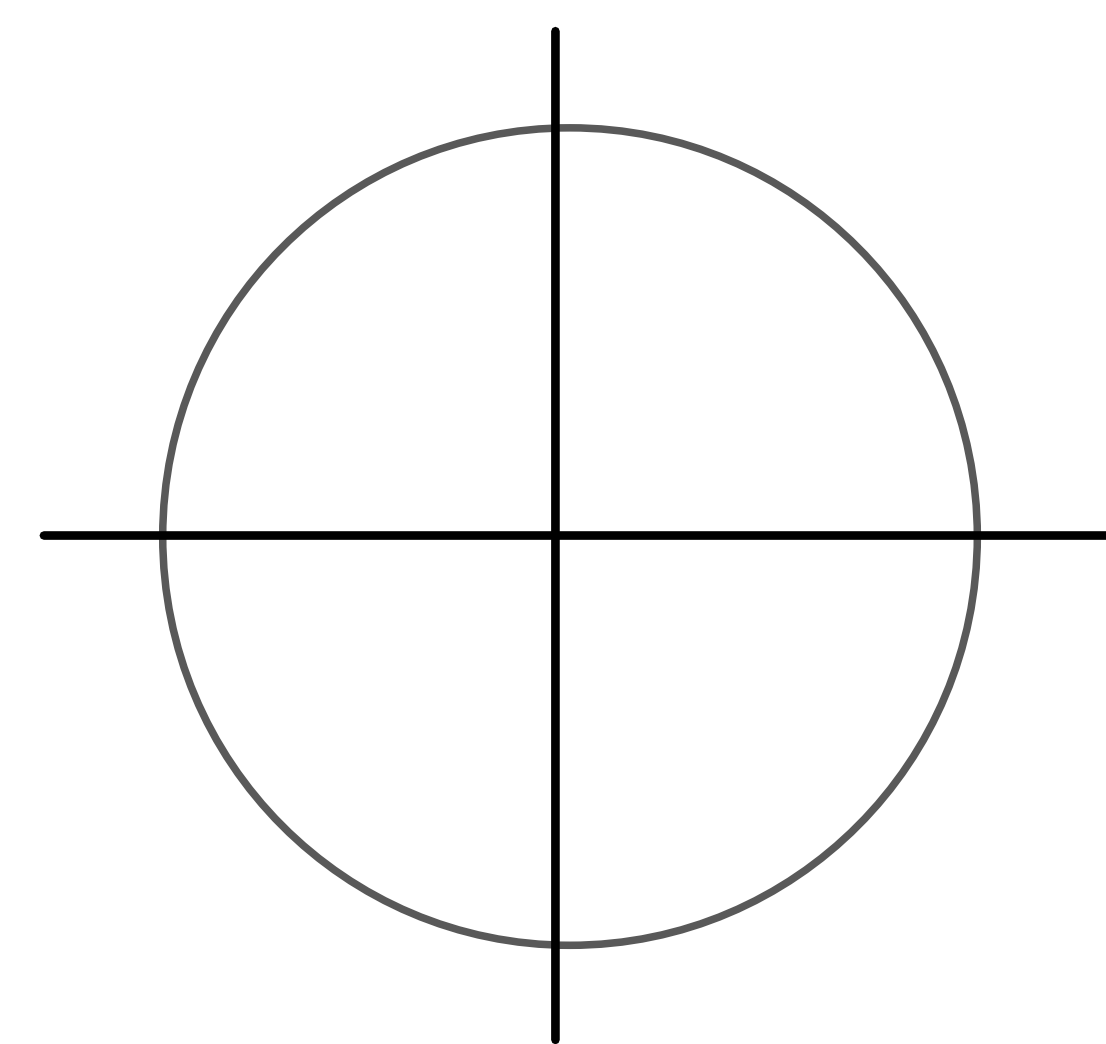
f)  $3 + 4i$  I



$-1 - \sqrt{3}i = 2 \left( -\frac{1}{2} - \frac{\sqrt{3}}{2}i \right)$



$$\begin{cases} \cos \theta = -1/2 \\ \sin \theta = -\sqrt{3}/2 \end{cases} \quad \theta = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$$



$\begin{cases} \cos \theta = -1/2 \\ \sin \theta = -\sqrt{3}/2 \end{cases} \Rightarrow \theta = 120^\circ \text{ ou } -120^\circ$

$\theta = -60^\circ \text{ ou } 240^\circ = 240^\circ \cdot \frac{\pi}{180} = \frac{4\pi}{3}$

$-60^\circ + \dots = 120^\circ$

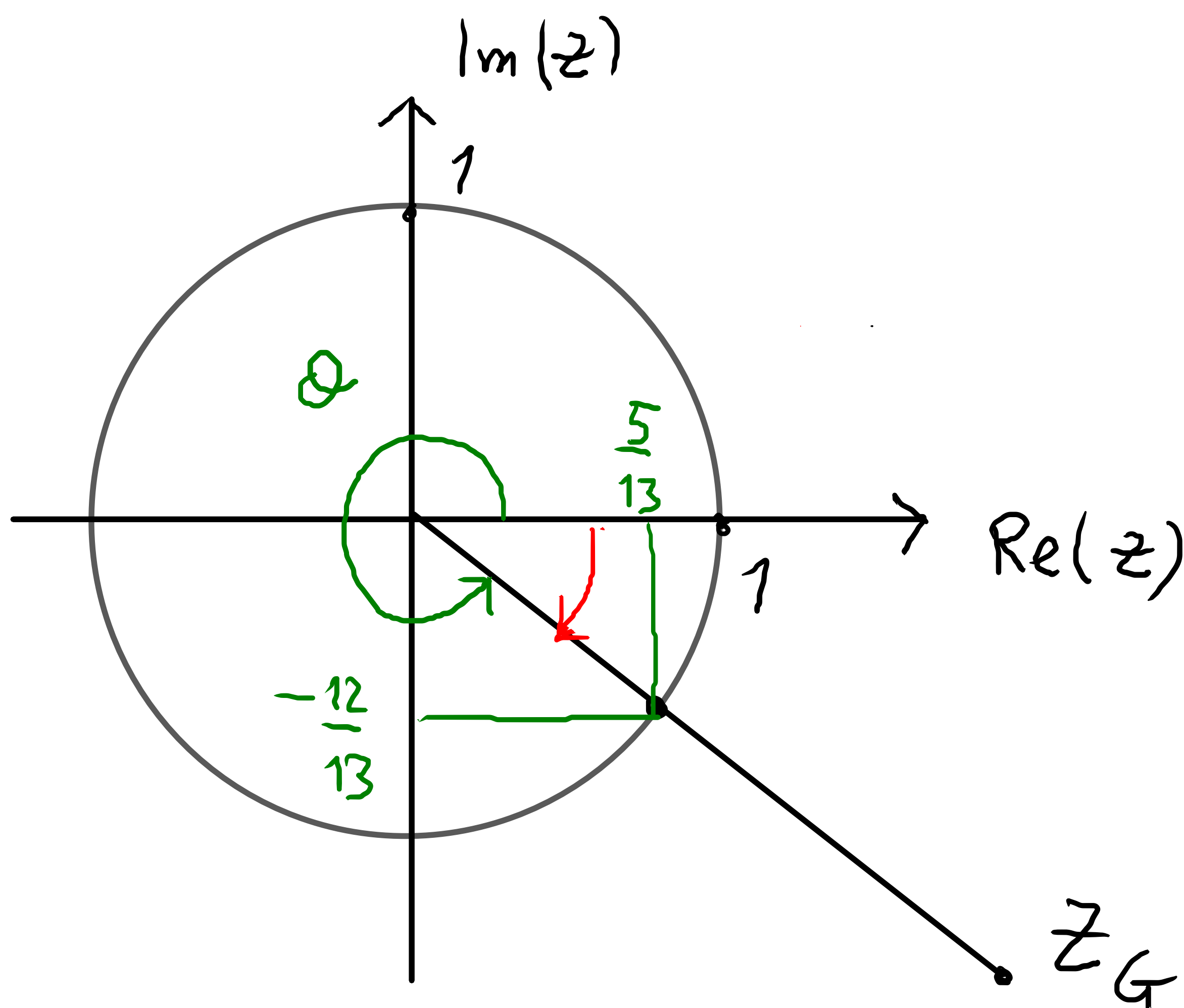
$$f) 3 + 4i = z_F \quad |z_F| = 5$$

$$z_F = 5 \left( \underset{\substack{\uparrow \\ \cos \theta}}{\frac{3}{5}} + \underset{\substack{\uparrow \\ \sin \theta}}{\frac{4}{5}i} \right) = [5; 0.927295218001612]$$

$$g) 5 - 12i = z_G$$

$$|z_G| = 13$$

$$z_G = 13 \left( \frac{5}{13} - \frac{12}{13}i \right)$$



$$\begin{cases} \cos \theta = \frac{5}{13} \Rightarrow \theta = 1.176005207095135 \text{ OU } \theta = -1.176005207095135 \\ \sin \theta = -\frac{12}{13} \Rightarrow \theta = -1.176005207095135 \text{ OU } \theta = 4.317597860684928 \end{cases}$$

$$z_G = [13; 5.107180307179586]$$

1.2.3 Écrire les nombres complexes ci-dessous sous forme algébrique:

a)  $\left[4; -\frac{\pi}{3}\right]$

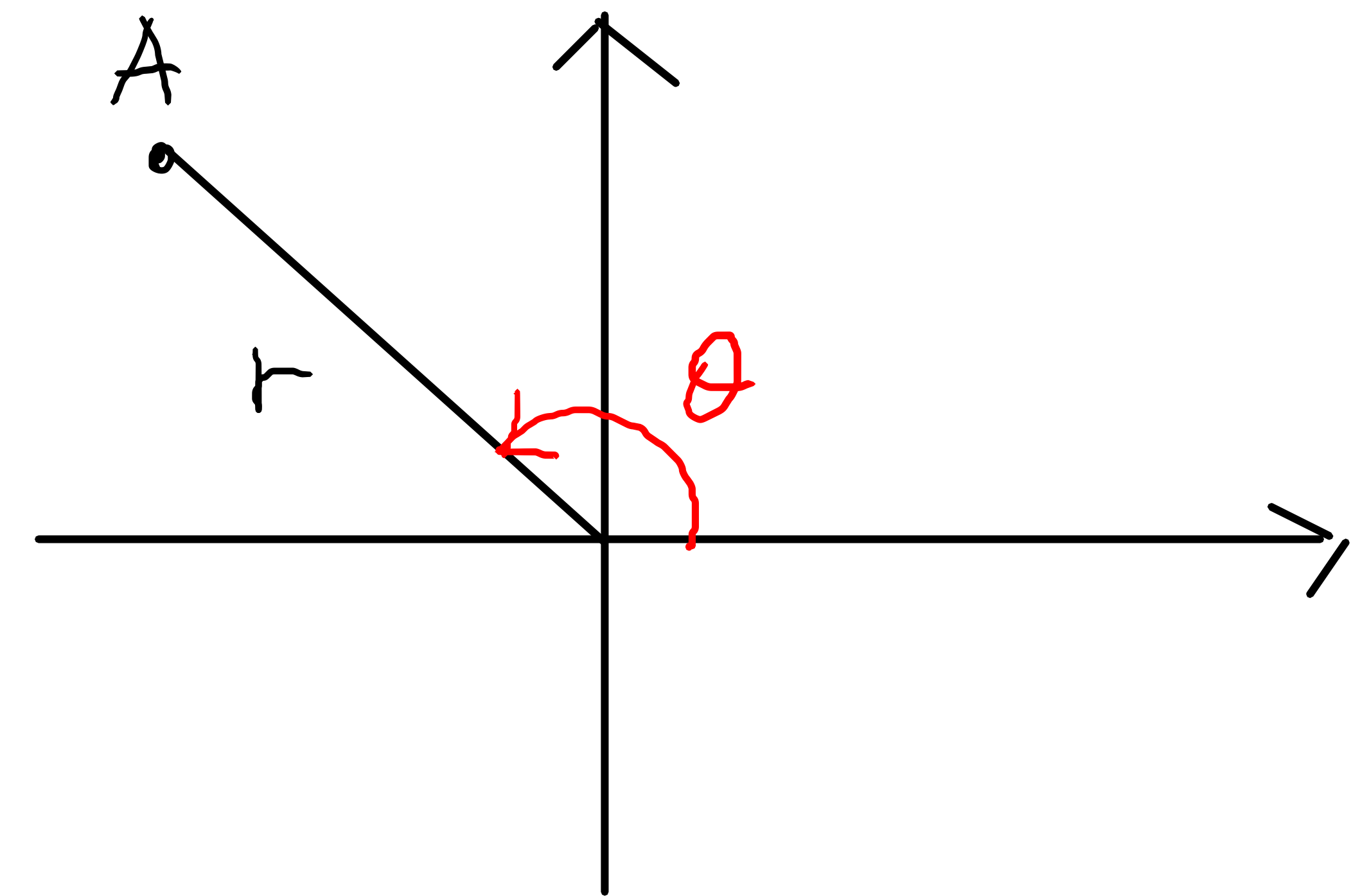
b)  $\left[\frac{3}{4}; \frac{3\pi}{4}\right]$

c)  $[\pi; -\pi]$

d)  $\left[4; \frac{\pi}{3}\right]$

e)  $\left[1; -\frac{\pi}{2}\right]$

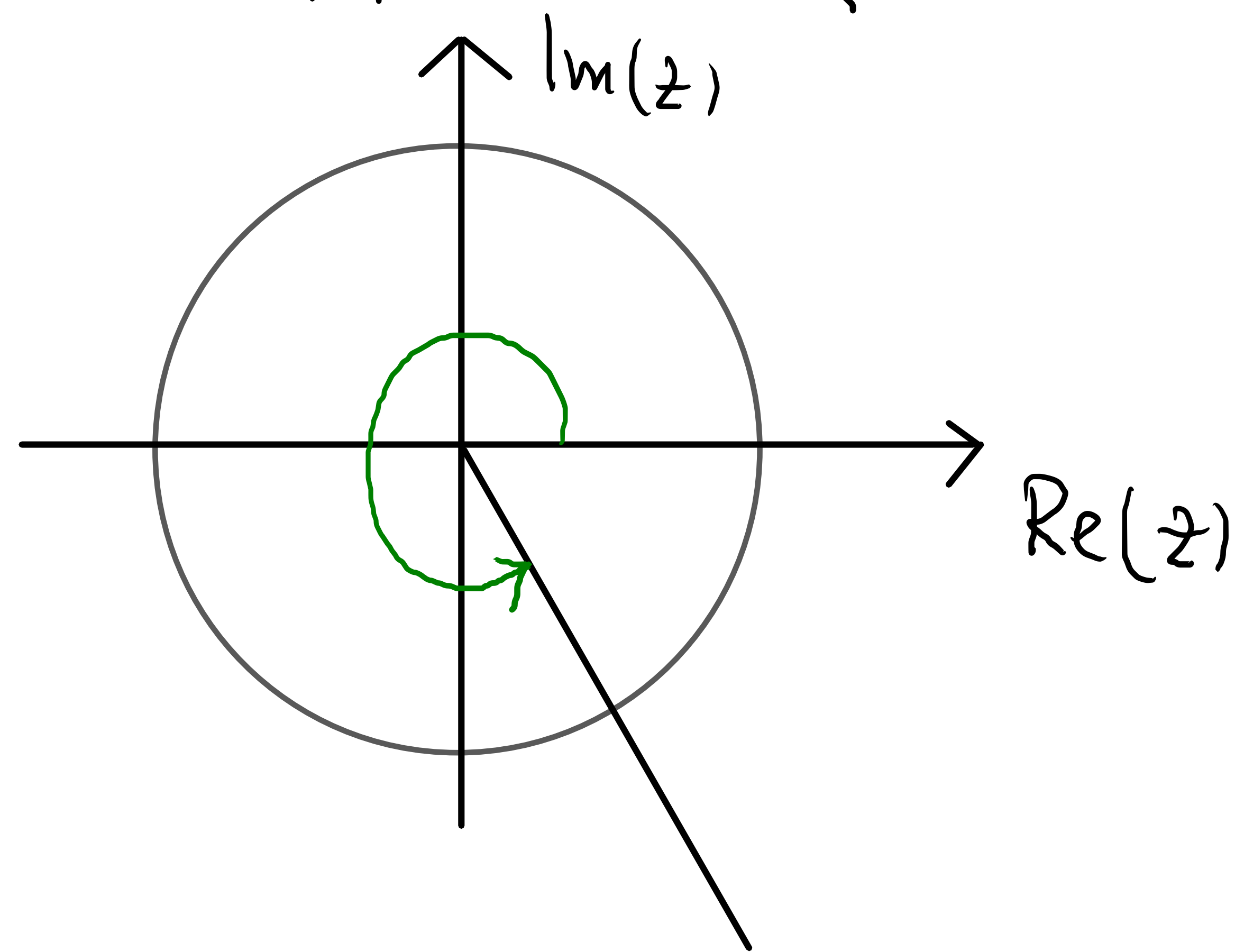
f)  $e^{i\pi}$  *plus tard*



$z_A = a + bi$  ,  $|z_A| = r$  argument  $\theta$

$z_A = [r, \theta] = r (\cos \theta + \sin \theta i)$

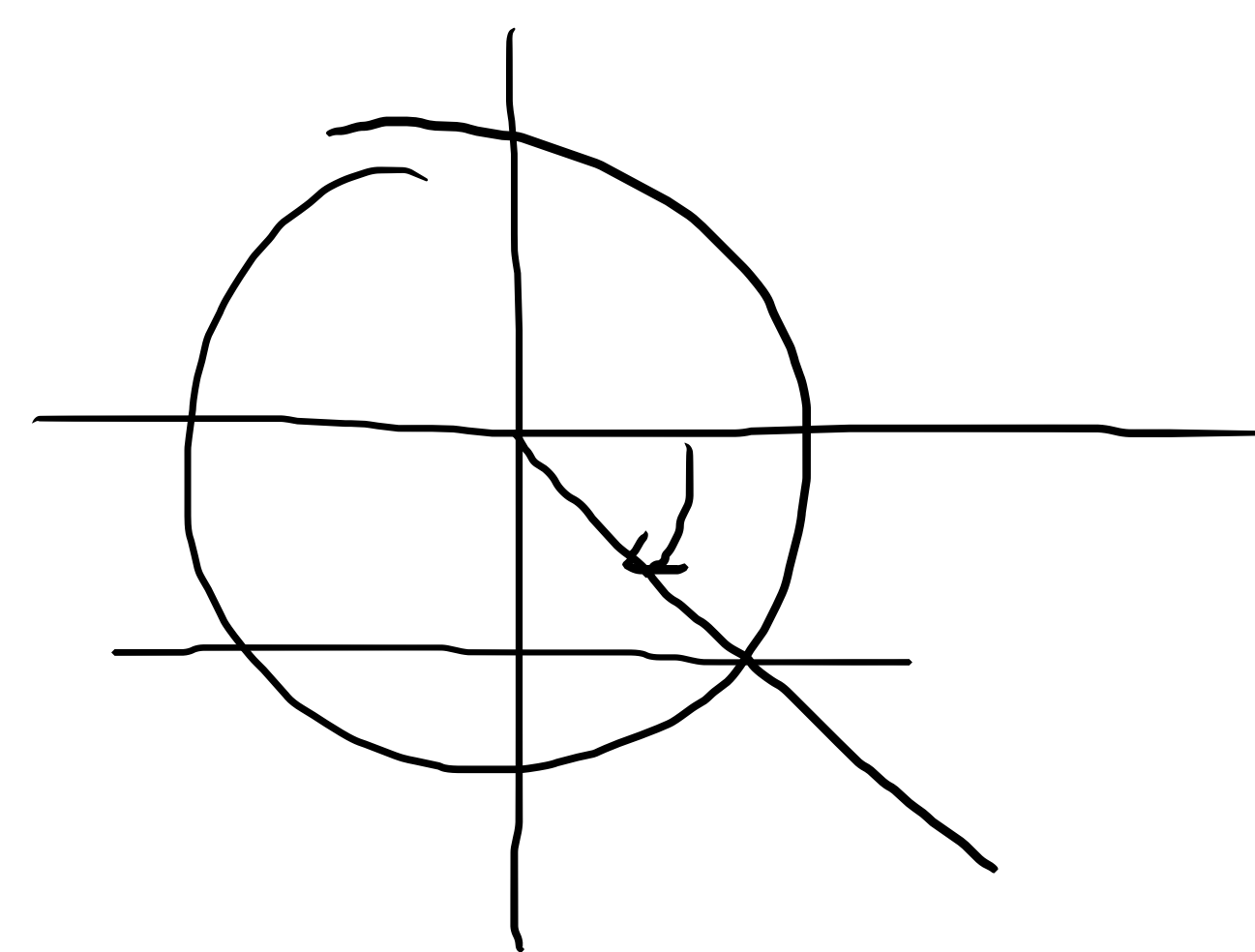
a)  $z_A = 4 \left( \cos\left(-\frac{\pi}{3}\right) + \sin\left(-\frac{\pi}{3}\right) i \right) = 4 \left( \frac{1}{2} - \frac{\sqrt{3}}{2} i \right) = 2 - 2\sqrt{3}i$



$\theta = 300^\circ$

$\cos\left(-\frac{\pi}{3}\right) = \cos(-60^\circ) = \cos(60^\circ) = \frac{1}{2}$

$\sin\left(-\frac{\pi}{3}\right) = \sin(-60^\circ) = -\sin(60^\circ) = -\frac{\sqrt{3}}{2}$



•  $\cos(-\alpha) = \cos(\alpha)$

•  $\sin(-\alpha) = -\sin(\alpha)$

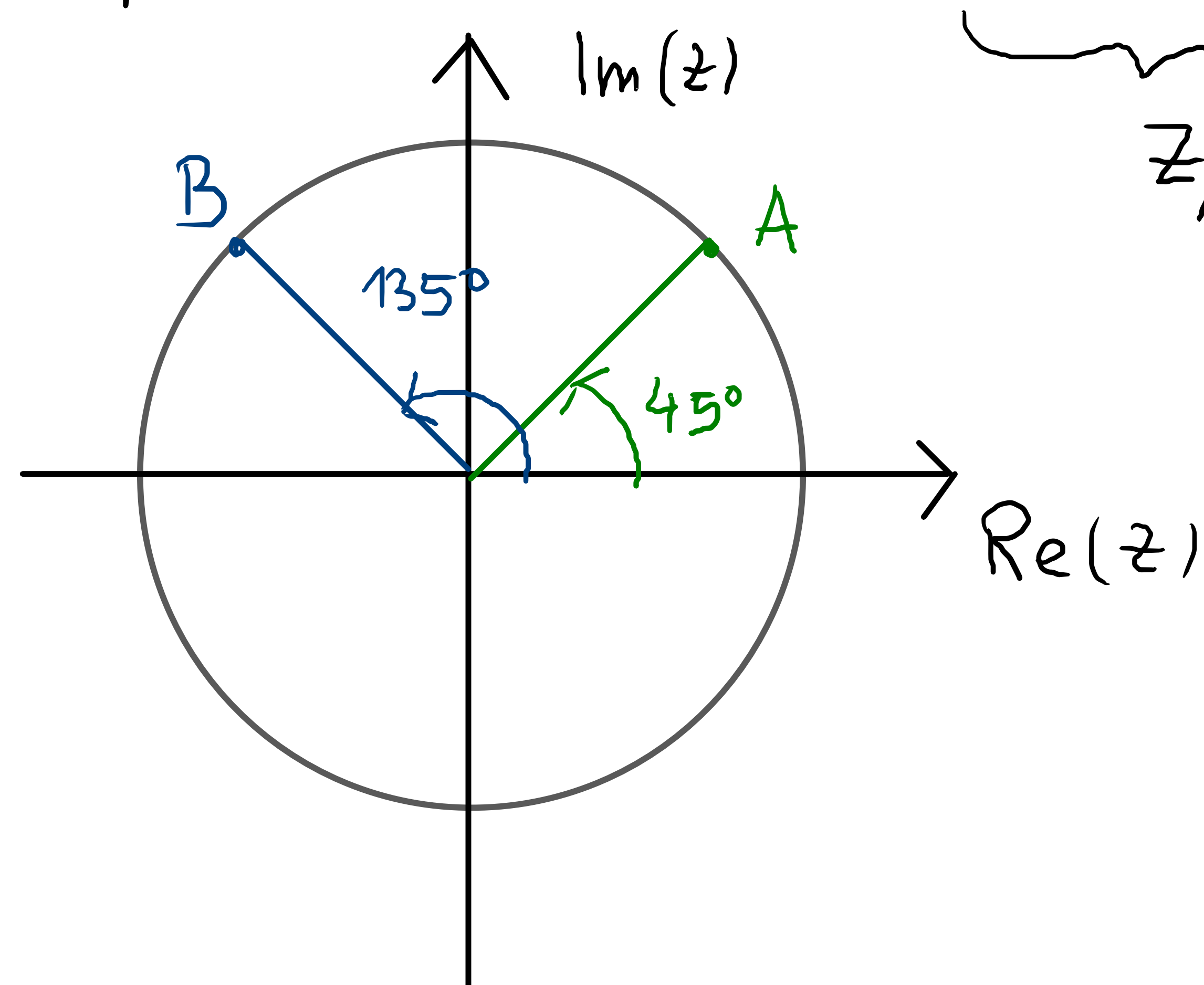
1.2.4 Calculer :

a)  $\left[2; \frac{\pi}{4}\right] \cdot \left[3; \frac{\pi}{6}\right]$

b)  $\left[6; \frac{2\pi}{3}\right] : \left[3; -\frac{\pi}{3}\right]$

c)  $\left[2; \frac{\pi}{3}\right]^3$

d) plus simple



$\underbrace{\left[1; \frac{\pi}{4}\right]}_{z_A} \cdot \underbrace{\left[1; \frac{3\pi}{4}\right]}_{z_B}$

$$= \left[1; 45^\circ\right] \cdot \left[1; 135^\circ\right]$$

$$= \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right) \left(-\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right)$$

$$= \frac{\sqrt{2}}{2} (1+i) \cdot \frac{\sqrt{2}}{2} (-1+i)$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2}}{2} (1+i)(-1+i)$$

$$= \frac{1}{2} (-1+i^2) = \frac{1}{2} \cdot (-2) = -1$$

Donc  $\left[1; \frac{\pi}{4}\right] \cdot \left[1; \frac{3\pi}{4}\right] = \left[1; \pi\right]$

The diagram shows the multiplication of two complex numbers in polar form. The first number  $\left[1; \frac{\pi}{4}\right]$  and the second number  $\left[1; \frac{3\pi}{4}\right]$  are circled in blue. A blue arrow points from the angle  $\frac{\pi}{4}$  to the angle  $\pi$  in the result  $\left[1; \pi\right]$ , indicating the addition of angles. A green arrow points from the magnitude 1 of the first number to the magnitude 1 of the result, indicating the multiplication of magnitudes. A plus sign is placed above the multiplication dot, and a green 'x' is placed below the multiplication dot.

En fait

$$\boxed{[r_1, \theta_1] \cdot [r_2, \theta_2] = [r_1 \cdot r_2, \theta_1 + \theta_2]}$$